MA 114 — Calculus II

Spring 2013

Exam 3

9 April 2013

Name: _____

Section: _____

Last 4 digits of student ID #: _____

This exam has six multiple choice questions (six points each) and five free response questions with points as shown. Additional blank sheets are available if necessary for scratch work. No books or notes may be used. Turn off your cell phones and do not wear ear-plugs during the exam. You may use a calculator, but not one which has symbolic manipulation capabilities.

On the multiple choice problems:

1. You must give your *final answers* in the *multiple choice answer box* on the front page of your exam.

2. Carefully check your answers. No credit will be given for answers other than those indicated on the *multiple choice answer box*.

On the free response problems:

1. Clearly indicate your answer and the reasoning used to arrive at that answer *(unsupported answers will not receive credit)*.

2. Give exact answers, rather than decimal approximations to the answer (unless otherwise stated).

Each free response question is followed by space to write your answer. Please write your solutions neatly in the space below the question. You are not expected to write your solution next to the statement of the question.

Multiple Choice Answers

Question					
1	A	B	C	D	E
2	A	B	C	D	E
3	A	B	C	D	E
4	A	B	C	D	E
5	A	B	C	D	E
6	A	B	C	D	E

Exam Scores

Question	Score	Total
MC		36
7		12
8		14
9		12
10		14
11		12
Total		100

Record the correct answer to the following problem on the front page of this exam.

(1) Which one of the following differential equations corresponds to the given slope field?
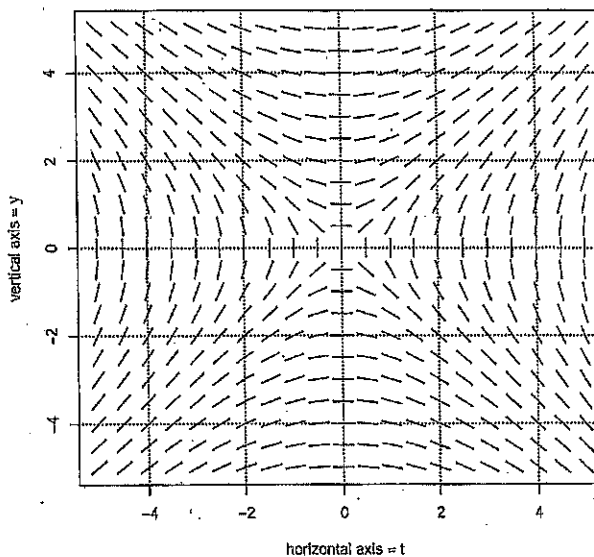
A) $\dot{y} = \dfrac{t-y}{t}$

B) $\dot{y} = \dfrac{t}{y}$

C) $\dot{y} = ty$

D) $\dot{y} = \dfrac{y+t}{t}$

E) $\dot{y} = \dfrac{y+t}{y-t}$

(2) Given that $y(t)$ is a solution to the logistics equation $\dot{y} = 5y(4-y)$ with $y(0) = 2$, which statement best describes the behavior of this solution?

A) $y(t)$ decreases to $\frac{1}{4}$ as $t \to \infty$.

B) $y(t)$ increases to 1 as $t \to \infty$.

C) $y(t)$ decreases to $-\infty$ as $t \to \infty$.

D) $y(t)$ increases to 4 as $t \to \infty$.

E) $y(t)$ remains constant at 2 as $t \to \infty$.

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(3) Which of the following infinite series is not a geometric series?

A) $\displaystyle\sum_{n=0}^{\infty} \frac{1}{5^n}$

B) $\displaystyle\sum_{n=0}^{\infty} \frac{4^n}{28^n}$

C) $\displaystyle\sum_{n=0}^{\infty} \frac{1}{n^6}$

D) $\displaystyle\sum_{n=0}^{\infty} \pi^{-n}$

E) They are all geometric series.

(4) Which of the following is the integrating factor for $y' + 2xy = x^2$?

A) x^2

B) $\ln(x^2)$

C) e^x

D) e^{x^2}

E) The equation does not have an integrating factor since it is not linear.

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(5) Find the sum of the telescoping series

$$\sum_{n=1}^{\infty} \left(\frac{1}{n+1} - \frac{1}{n+2} \right)$$

A) $\frac{1}{2}$

B) $\frac{1}{3}$

C) The series has no sum since it diverges.

D) The series converges but the sum can't be determined.

E) 1

(6) What is the radius of convergence for the power series

$$\sum_{n=0}^{\infty} (-2x)^n$$

A) 1

B) 2

C) 0

D) ∞

E) $\frac{1}{2}$

(7)   Solve the 1st order linear initial value problem

$$xy' - 3y = x^3$$

with $y(1) = 2$.

(8) Given the alternating series

$$\sum_{n=0}^{\infty}(-1)^n a_n = \sum_{n=0}^{\infty}(-1)^n \frac{1}{n+1}$$

(a) Determine if the series converges absolutely, converges conditionally, or diverges.

(b) Given the fact that $|S - S_N| \leq a_{(N+1)}$, where S_N is the Nth partial sum of S, what is the smallest N such that $|S - S_N| \leq 10^{-2}$?

(9) Use the ratio test to determine if the series

$$\sum_{n=0}^{\infty} \frac{n!(2^n)}{(n+1)!}$$

converges or not.

(10) Use the integral test and the comparison test to decide whether

$$\sum_{n=0}^{\infty} ne^{-n^3}$$

converges or not. (Hint: $ne^{-n^3} \leq n^2 e^{-n^3}$)